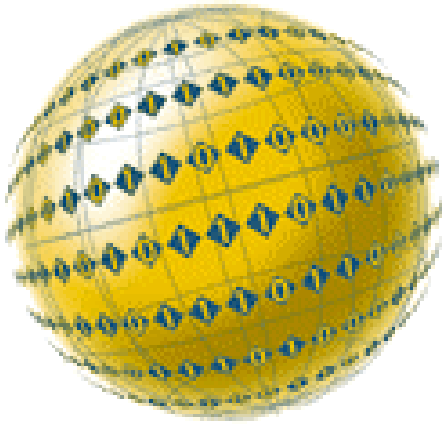


Allied Telesyn

Simply connecting the IP world

The AR320 & AT-Firewall Configuration Guide

Version 2.0

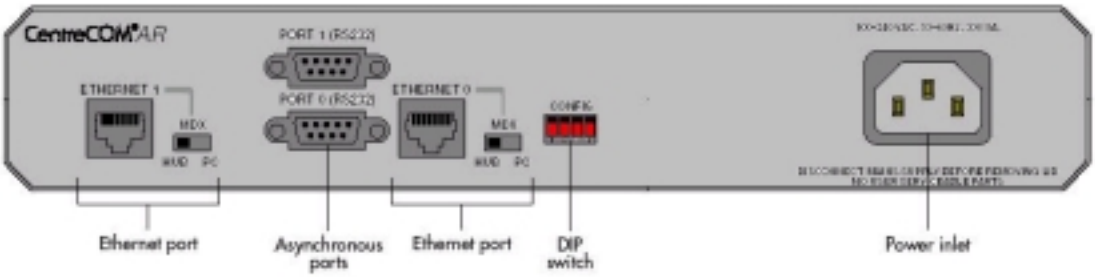
1 Contents

2 Legal Notices

3 Initial Connection & Configuration

3.1 Initial Connection to the Router

Connect to the router using the supplied Async cable. The cable should connect a free COM port on your PC. The cable will plug onto the D9 port on the router. If the router has more than one Async port then connect to Port0, also referred to as Asyn0 or sometimes the 'config port'.



The router should be configured using a DEC VT100 terminal. A suitable VT100 terminal emulator called HyperTerminal is included in the standard Windows 9x build. There are many alternative terminal emulators on the market such as the excellent TeraTerm, Putty and ProComm Plus packages.

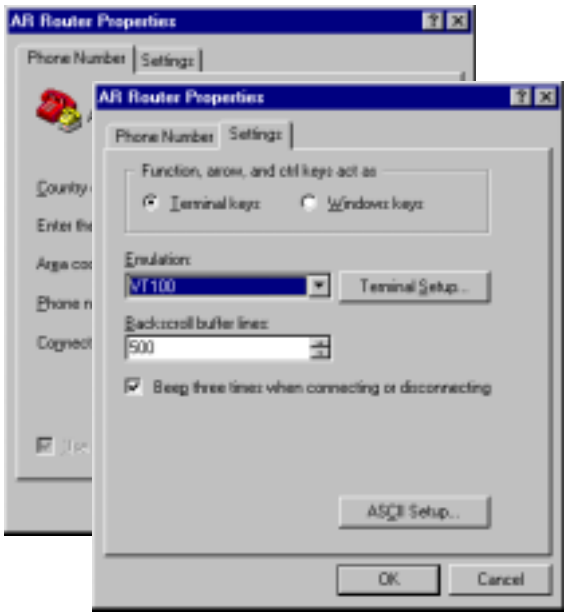
In HyperTerminal, make a 'New Connection' and connect using 'Direct out of Com 1' or 'Com 2' if appropriate.

The next screen will offer the appropriate Baud rate and flow control. The appropriate selections are:

Bits per second	9600
Data bits	8
Parity	None
Stop bits	1
Flow Control	Hardware

After selecting OK, you will be presented with the main screen. Now go to the 'File' menu and select 'Properties' to adjust some of HyperTerminal's default settings

Function, arrow, and ctrl keys act as	Terminal keys
Emulation	VT100
Backscroll buffer lines	500
Beep three times when connecting or disconnecting	Checked

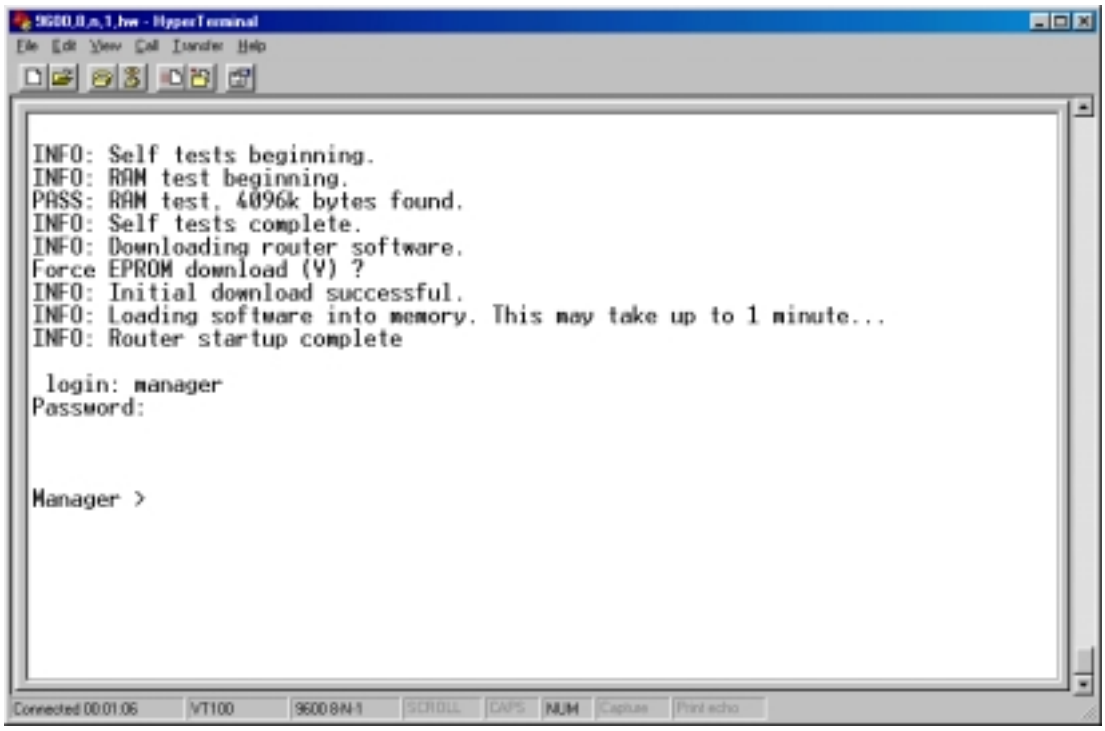


3.2 Login to the Router

Upon reboot, the router will output the Power-on Self Test (POST) messages out of the Asyn0 port at [9600, 8, n, 1, no-flow]. From then all console interaction will take place at [9600, 8, n, 1, hardware].

If you do not get a login prompt within one minute of a reboot, check your Async cable is fully wired and that the flow control is set to 'hardware'.

The default username is 'manager' and the default password is 'friend'. Both are in lowercase.



3.2.1 Logging out of the Router

Remember to always logout of your firewall after having logged in.

```
Manager red>

Manager red>

Manager red> logout


red login:
```

3.3 Online help

The AlliedWare™ online help system can be accessed by typing 'help' at the command prompt. This shows all the arguments and parameters for a specific software module. This is not intended to replace the Software Reference Manual but is intended to prompt the user.

```
Manager > help

        AR300 and AR700 Series Routers   HELP v2.2.1 Rev A, 09-May-2001

  Help is available on the following topics.

    HELP asynchronous         Async ports, TTY, & Asynchronous call control

    HELP ETH                  Ethernet interface commands

    HELP SYN                  Synchronous interface commands

    HELP PPP                  Point to Point protocol commands

    HELP FR                   Frame Relay protocol commands

--More--  (<space> = next page, <CR> = one line, C = continuous, Q = quit)
```

3.4 Online command prompt

AlliedWare™ also includes a command prompt that shows all the arguments for a specific software module. This can be accessed using the question mark '?'.

```
Manager > sho ?

  Options : ACC ALIas APPletalk BOOTp BRIDge BRI BUFfer CONfig CPU DECnet

    DEBug DHCP DVMrp ENCo ETH EXception FIle FEAture FIREwall FFIle FLash

    FRamerelay GRE GUI HTTP INSTall INTerface IP IPV6 IPSec IPX ISAkmp ISDN

    L2TP LAPB LAPD LDAP LOAder LOG LPD MAnager MAIL MIOX NTP OSPF PATch

    PBX PERM PIM PING PKT ASYn POrt PKI PPP PRI Q931 RADius RELease RSVP

    SA SCript SERvice SNmp SSH STAR STARTup STReam SYN SYStem TELnet TPAD

    TRAce TRIGger SESsions TCP TEST TIme TTy TACacs USEr VRRp X25T TDM
```

A command is shown with the minimum required command capitalised. Hence 'SHow' implies that 'sh' is the minimum required to execute the command. Capital letters are not required at any stage in the router.

3.5 Checking the Software Version

First, check the software version of your unit with the <show system> command.

```
Manager > sho sys

Router System Status                              Time 10:48:12 Date 30-Oct-2001.

Board      ID  Bay Board Name                        Rev   Serial number

-------------------------------------------------------------------------------

Base       82      AR320                             M2-0  41912745

MAC        66      AR010 EMAC                        M2-0  49881793

-------------------------------------------------------------------------------

Memory -   DRAM :  8192 kB    FLASH :  2048 kB

-------------------------------------------------------------------------------

SysDescription

Allied Telesyn AR320 version 2.2.2-01 06-Jul-2001

--More--  (<space> = next page, <CR> = one line, C = continuous, Q = quit)
```

It is recommended that you check the Allied Telesyn Research web-site to see that your router is loaded with the latest patch for your software release.

http://www.alliedtelesyn.co.nz/support/patches

Details of upgrading patches & release are covered in Appendix A.

3.6 Checking & Setting the System Date & Time

It is essential with any computer equipment to ensure the date and time are accurately set. This is important so that the router's internal logs will match up with other computer equipment's logs so that problems such as attempted intrusions or attacks can be documented.

In order to check the time and the date

```
Manager > sho time

System time is 10:53:26 on Tuesday 30-Oct-2001.
```

In order to set the time

```
Manager > set time=9:48:00

System time is 09:48:00 on Tuesday 30-Oct-2001.
```

In order to set the date

```
Manager > set date=31-oct-2001

System time is 09:48:33 on Wednesday 31-Oct-2001.
```

The Router also supports Network Time Protocol to get an IP address from the Internet as a client and can also act as an NTP server to devices on the LAN over IP. This is covered in the Network Time Protocol Chapter of the Reference Manual.

3.7 Showing and Deleting Files on a Router

To display the files on the unit

```
Manager > sho file

Filename            Device        Size     Created               Locks

-------------------------------------------------------------------------

8-222.rez           flash         1668860  01-Aug-2001 09:47:41    0

8222-01.paz         flash         12264    01-Aug-2001 09:52:43    0

feature.lic         flash         39       23-Mar-2001 08:36:56    0

help.hlp            flash         139682   23-Jun-2001 01:03:44    0

prefer.ins          flash         64       01-Aug-2001 09:57:54    0

release.lic         flash         96       01-Aug-2001 09:32:29    0

test01.cfg          flash         1961     31-Oct-2001 09:49:17    0

-------------------------------------------------------------------------
```

To rename a file

```
Manager > rename test01.cfg test02.cfg

Info (131263): Flash file rename under way...

DO NOT restart the router or alter Flash until rename is completed.


Manager >

Info (131264): Flash file rename successfully completed.
```

To delete a file

```
Manager > del file=test02.cfg

Info (156003): Operation successful.
```

In order to check the integrity of all file files on the unit, the 'sho ffile check' command can be used. This uses the checksum within the file to ensure the file is complete. This is similar to 'chkdsk' or 'scandisk'.

```
Manager > sho ffile check

dev   creator  name      type       size   file date & time    address check

------------------------------------------------------------------------------

flash          help      hlp      139682  23-Jun-2001 01:03:44  01CC00B8  Good

flash  inst    release   lic          96  01-Aug-2001 09:32:29  01CE23A4  Good

flash  load    8222-01   paz       12264  01-Aug-2001 09:52:43  01C79B80  Good

flash  load    8-222     rez     1668860  01-Aug-2001 09:47:41  01CE2444  Good
```

The amount of free space within the flash can be see with the 'show flash' command.

```
Manager > sho flash

FFS info:

global operation ...... none

compaction count ...... 5

est compaction time ... 120 seconds

files ................   1821472 bytes  (6 files)

garbage ..............     85316 bytes

free .................     59292 bytes

required free block ...    131072 bytes

total ................   2097152 bytes

--More--  (<space> = next page, <CR> = one line, C = continuous, Q = quit)
```

Garbage is wasted space which can be reclaimed with the 'activate flash compaction' command. This defragments the flash to provide contiguous free space. Do not restart, reboot or turn off the router until this process has completed.

```
Manager > act flash comp

Info (131260): Flash compacting...

DO NOT restart the router until compaction is completed.


Manager >

Info (131261): Flash compaction successfully completed.
```

3.8 Restarting the unit

There are two types of software restart:

restart router	reloads the router configuration file
restart reboot	reloads the release, patch and configuration file. This may take up to 1 minute...

4 Saving your Router Configuration

Whenever a command is passed from a prompt, boot config file or runtime script to the command interpreter, the command takes immediate effect and the configuration is updated in the Dynamic RAM.

If the router is restarted before the configuration is saved then the command is lost. In order to create a copy of the 'Dynamic Configuration' into a 'Configuration file' in flash, the 'create config' command is used. Configuration files are expected in 8.3 format with a *.cfg extension.

```
Manager > create config=test01.cfg

Info (149003): Operation successful.
```

The router can store more than one configuration file in the flash. Therefore the router needs to be told which configuration file to boot from next time. This is achieved with the 'set config command'.

```
Manager > set config=test01.cfg

Info (149003): Operation successful.
```

The configuration file to boot from next time can be seen with the 'show config' command.

```
Manager > sho con

Boot configuration file: test01.cfg (exists)

Current configuration: None
```

4.1 Viewing the Dynamic Configuration

To see the dynamic configuration in the DRAM, the 'show config dynamic' command can be used. This will list all the commands that differ from the router defaults. The commands are parsed and always displayed in the same order. Long lines are sometimes split into two shorter lines. Commands are often abbreviated.

```
Manager > sho con dyn
#
# SYSTEM configuration
#


#
# PPP configuration
#
create ppp=0 over=tnl-test


#
# IP configuration
#
enable ip
add ip int=eth0 ip=192.168.1.1
--More--  (<space> = next page, <CR> = one line, C = continuous, Q = quit)
```

The output of this command can be very long and it may take several presses of the space bar to reach the page you require. In this case, 'show con dyn=*module*' can be used to jump straight to the appropriate section

```
Manager > sho con dyn=ip
#
# IP configuration
#
enable ip
add ip int=eth0 ip=192.168.1.1
```

5 General Configuration

5.1 Setting System Name, Contact, Location & Territory

When managing an estate of communications devices, it is helpful to assign a system name, contact & location. This means the device can be easily recognised, the manager can be easily identified and the unit can be easily found. These directly correlate to SNMP MIB values.

```
Manager > set sys name=red

Info (134003): Operation successful.


Manager red> set sys contact=admin@mydomain.example

Info (134003): Operation successful.


Manager red> set sys loc="abingdon, uk"

Info (134003): Operation successful.
```

It is possible to set the SysName as a Fully Qualified Domain Name (FQDN) such as "red.mydomain.example". This means that Mail Subsystem and the Terminal Server (Telnet) modules automatically consider the domain to be "mydomain.example". The unfortunate side affect of a long system name is that it reduces the total VT100 command length and very long commands can no longer be input. While configuring the unit, a short system name is recommended for convenience. RFC 1178 includes a convention for appropriate naming of network devices.

The output can be seen by typing 'show system'.

```
Manager red> sho sys

SysDescription

  Allied Telesyn AR320 version 2.2.2-01 06-Jul-2001

SysContact

  admin@mydomain.example

SysLocation

  abingdon, uk

SysName

  red

--More--  (<space> = next page, <CR> = one line, C = continuous, Q = quit)
```

Another important operation is to set the unit to operate in Europe. This defines defaults for Europe in a variety of software modules such as ISDN, PBX & Q.931.

```
Manager red> set sys terr=europe

Info (134263): Q931, PRI and PBX parameters (where applicable) set to

defaults for specified territory.
```

***Remember**: Now that you have set the SysName, SysContact, SysLocation and SysTerritory, remember to 'create' and then 'set' your config*

```
Manager red> create con=test02.cfg

Info (149003): Operation successful.


Manager red> sho con

Boot configuration file: test01.cfg (exists)

Current configuration: test01.cfg


Manager red> set con=test02.cfg

Info (149003): Operation successful.


Manager red> sho con

Boot configuration file: test02.cfg (exists)

Current configuration: test01.cfg
```

6 LAN configuration

6.1 Basic LAN Configuration

Firstly enable the IP module and then Eth0 as an IP interface

```
Manager red> ena ip

Info (105287): IP module has been enabled.


Manager red> add ip int=eth0 ip=192.168.1.1

Info (105275): interface successfully added.
```

Now look at the interface table in the router with <show ip interface>

```
Manager red> sho ip int

Interface     Type     IP Address       Bc Fr PArp  Filt RIP Met.   SAMode  IPSc

Pri. Filt     Pol.Filt Network Mask     MTU   VJC   GRE  OSPF Met.  DBcast  Mul.

-------------------------------------------------------------------------------

Local         ---      Not set          -  -  -     ---  --         Pass    --

---           ---      Not set          1500  -     ---  --         ---     ---

eth0          Static   192.168.1.1      1  n  On    ---  01         Pass    No

---           ---      255.255.255.0    1500  -     ---  0000000001 No      Rec

-------------------------------------------------------------------------------
```

Now look at the routing table in the router with <show ip route>

```
Manager red> sho ip route

IP Routes

-------------------------------------------------------------------------------

Destination       Mask              NextHop             Interface           Age

DLCI/Circ.        Type     Policy   Protocol            Metrics      Preference

-------------------------------------------------------------------------------

192.168.1.0       255.255.255.0     0.0.0.0             eth0                 66

-                 direct   0        interface           1                     0

-------------------------------------------------------------------------------
```

6.2 Testing the LAN configuration

You can ping devices on the LAN using the ping client from the router's prompt. Since a router has more than one IP address by definition, the source address of the ping can be specified at the prompt with the <sipaddress> argument. If you do not specify the source address then unpredictable results may occur when traversing the routing table or using NAT.

It is assumed that there is a PC with an IP address of 192.168.1.5 and a default gateway of 192.168.1.1 connected to Eth0 via a hub, switch or crossover. You do not need the gateway on the PC to be set at this stage, but it is easy to forget later.

```
Manager red> ping 192.168.1.5 sipaddress=192.168.1.1


Echo reply 1 from 192.168.1.5 time delay 3 ms

Echo reply 2 from 192.168.1.5 time delay 3 ms

Echo reply 3 from 192.168.1.5 time delay 2 ms
```

If you do not get a response then check the cable & the link-light.

6.3 Configuring the router as a DHCP server

The router can act as a DHCP server to hand out IP addresses to devices on the LAN. First, a DHCP policy must be created which will be the settings to hand out to each PC.

```
Manager red> ena dhcp


Manager red> create dhcp poli=d lease=7200
Info (170003): Operation successful.


Manager red> add dhcp poli=d nbnode=b-node router=192.168.1.1 dnss=158.43.240.4,
193.113.212.38 subnet=255.255.255.0
Info (170003): Operation successful.
```

Now ranges or pools of addresses have to be defined

```
Manager red> cre dhcp range=d1 policy=d ip=192.168.1.16 num=8
Info (170003): Operation successful.


Manager red> cre dhcp range=d2 policy=d ip=192.168.1.32 num=8
Info (170003): Operation successful.
```

The output of <sho con dyn=dhcp> should look something like this:

```
Manager red> sho con dyn=dhcp

#

# DHCP configuration

#

enable dhcp

create dhcp poli="d" lease=7200

add dhcp poli="d" subn=255.255.255.0

add dhcp poli="d" rou=192.168.1.1

add dhcp poli="d" dnss=158.43.240.4,193.113.212.38

add dhcp poli="d" nbno=b-node

create dhcp ran="d1" poli="d" ip=192.168.1.16 num=8

create dhcp ran="d2" poli="d" ip=192.168.1.32 num=8
```

Use the following commands to review the DHCP config.

```
Manager red> sho dhcp

DHCP Server

  State .................. enabled

  BOOTP Status ........... disabled

  Debug Status ........... disabled

  Policies ............... d

  Ranges ................. d1 ( 192.168.1.16 - 192.168.1.23 )

                           d2 ( 192.168.1.32 - 192.168.1.39 )
```

```
Manager red> sho dhcp poli

DHCP Policies

Name: d

  Base Policy: none

  01 subnetmask ....... 255.255.255.0

  03 router ........... 192.168.1.1

  06 dnsserver ........ 158.43.240.4  193.113.212.38

  46 nbnodetype ....... b-node

  51 leasetime ........ 7200
```

```
Manager red> sho dhcp range

DHCP Ranges

Name: d1

  Policy ..................... d

  Start Address .............. 192.168.1.16

  End Address ................ 192.168.1.23

  Used Address(es) ........... 192.168.1.16

  Free Address(es) ........... 192.168.1.17    192.168.1.18    192.168.1.19

                               192.168.1.20    192.168.1.21    192.168.1.22

                               192.168.1.23

--More--  (<space> = next page, <CR> = one line, C = continuous, Q = quit)
```

```
Manager red> sho dhcp client

DHCP Client Entries


IP Address      ClientId                  State   Type   Expiry

-------------------------------------------------------------------------------

192.168.1.16    00-10-a4-ef-70-0c         inuse   dyn    31-Oct-2001 13:17:42

192.168.1.17                              unused  dyn

192.168.1.18                              unused  dyn

192.168.1.19                              unused  dyn

--More--  (<space> = next page, <CR> = one line, C = continuous, Q = quit)
```

6.3.1 Resetting the DHCP server

The DHCP server keeps a MAC address table in the flash RAM or NVS RAM (if fitted). In case of major changes in the DHCP structure of the LAN, the following process will fully reset the DHCP server. This should not be necessary unless you are experiencing problems with DHCP addressing.

```
Manager red> disable dhcp


Manager red> del fil=*.dhc
Info (156003): Operation successful.


Manager red> del fil=nvs:*.dhc
Info (156003): Operation successful.


Manager red> restart rou
```

7 Configuring the WAN side

7.1 Configuring the WAN side with a Static IP address

This process is very similar to configuring the LAN side of the router.

```
Manager red> add ip int=eth1 ip=200.20.20.7 mask=255.255.255.0

Info (105275): interface successfully added.


Manager red> sho ip int


Interface     Type     IP Address       Bc Fr PArp  Filt RIP Met.   SAMode  IPSc
Pri. Filt     Pol.Filt Network Mask     MTU   VJC   GRE  OSPF Met.  DBcast  Mul.
------------------------------------------------------------------------------
eth0          Static   192.168.1.1      1  n  On    ---  01         Pass    No
---           ---      255.255.255.0    1500  -     ---  0000000001 No      Rec
eth1          Static   200.20.20.7      1  n  On    ---  01         Pass    No
---           ---      255.255.255.0    1500  -     ---  0000000001 No      Rec
------------------------------------------------------------------------------
```

Here we include a static route to the whole of the outside world.

```
Manager red> add ip route=0.0.0.0 mask=0.0.0.0 int=eth1 next=200.20.20.6

Info (105275): IP route successfully added.


Manager red> sho ip route

IP Routes

------------------------------------------------------------------------------
Destination       Mask             NextHop             Interface           Age
------------------------------------------------------------------------------
0.0.0.0           0.0.0.0          200.20.20.6         eth1                 12
200.20.20.0       255.255.255.0    0.0.0.0             eth1                125
192.168.1.0       255.255.255.0    0.0.0.0             eth0               1159
------------------------------------------------------------------------------
```

The output of <show config dynamic=ip> should now look something like this:

```
Manager red> sho con dyn=ip



#

# IP configuration

#

enable ip

add ip int=eth0 ip=192.168.1.1

add ip int=eth1 ip=200.20.20.7 mask=255.255.255.0

add ip rou=0.0.0.0 mask=0.0.0.0 int=eth1 next=200.20.20.6
```

7.2 Configuring the WAN side with a DHCP IP address

As an alternative to a static route, the router can be configured to receive an IP address, mask, default gateway and DNS via DHCP.

```
Manager red> ena ip remote

Info (105287): Remote IP assignment has been enabled.


Manager red> add ip int=eth1 ip=dhcp

Info (105275): interface successfully added.
```

```
Manager red> sho ip int

Interface     Type     IP Address       Bc Fr PArp  Filt RIP Met.   SAMode  IPSc
Pri. Filt     Pol.Filt Network Mask     MTU   VJC   GRE  OSPF Met.  DBcast  Mul.
------------------------------------------------------------------------------
eth0          Static   192.168.1.1      1  n  On    ---  01         Pass    No
---           ---      255.255.255.0    1500  -     ---  0000000001 No      Rec
eth1          Remote   200.20.20.163    1  n  On    ---  01         Pass    No
---           ---      255.255.255.0    1500  -     ---  0000000001 No      Rec
------------------------------------------------------------------------------
```

```
Manager red> sho ip route

IP Routes

------------------------------------------------------------------------------
Destination       Mask             NextHop             Interface           Age
DLCI/Circ.        Type     Policy   Protocol            Metrics      Preference
------------------------------------------------------------------------------
0.0.0.0           0.0.0.0          200.20.20.6         eth1                 42
-                 direct   0        static              1                   360
200.20.20.0       255.255.255.0     0.0.0.0             eth1                 42
-                 direct   0        interface           1                    0
192.168.1.0       255.255.255.0     0.0.0.0             eth0               1395
-                 direct   0        interface           1                    0
------------------------------------------------------------------------------
```

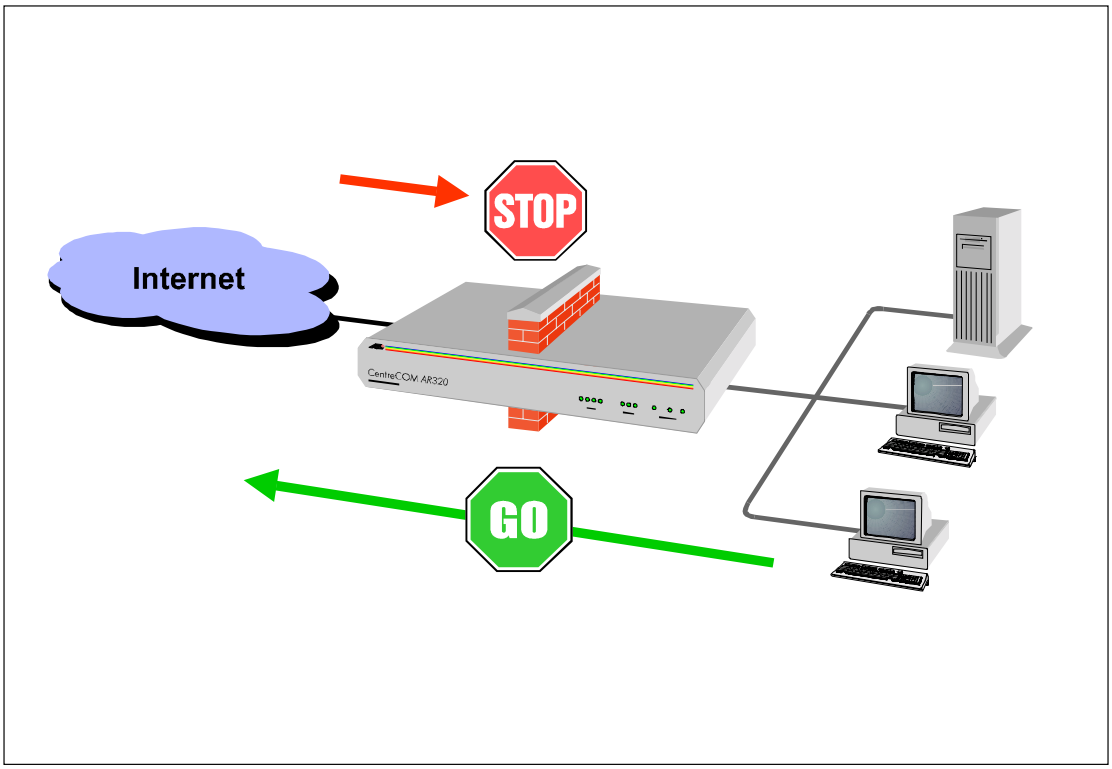
7.2.1 DNS relay

When the DNS is received dynamically, PCs cannot be configured to use the address from the ISP because it may change. In this scenario, the DNS relay function is used.

PCs would then set their DNS to be the Eth0 IP address of the router (192.168.1.1) and any requests the router received, it would relay on to the real DNS.

```
Manager red> ena ip dnsrelay

Info (105003): Operation successful.
```

8 The AT-Firewall



In the default configuration, traffic from the private network can reach the public network. Traffic from the public network cannot reach the private network unless it is in response to a flow that has originated from the private network. The AT-Firewall protects against the most common forms of hacking attempt and can either deny and/or log the event.

PINGOFDEATH. A denial of service attack in which a remote user sends ping packets with illegal sizes, or an excessive number of ICMP messages

SMURF. An Internet Control Message Protocol (ICMP) echo request with a broadcast destination address

HOSTSCAN. A scan of the hosts of the private network

PORTSCAN. A port scan of the firewall or private n1etwork

UDPATTACK. An attack using UDP packets to probe for open UDP ports

FRAGMENT. An attack using TCP fragments that are either too large or can never be reassembled

SMURFAMP. A TCP SYN packet with a broadcast destination address

SYNATTACK. An attack on a host using multiple opening TCP SYN packets to exhaust a host's available sessions or memory

TCPTINY. An attack on a host using TCP tiny fragments

IPSPOOF. An attack using IP packets in which the source address has been spoofed (altered)

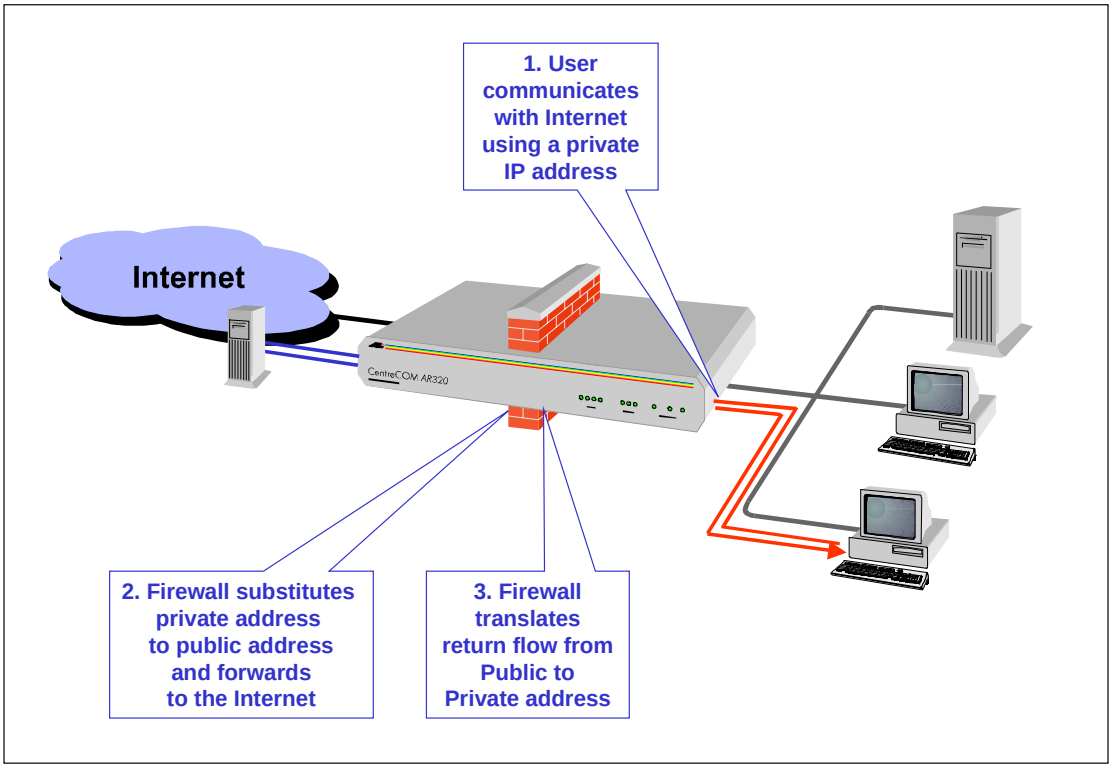
LAND. A denial of service attack in which a remote user sends IP packets with the same address in the source and destination address fields

8.1 Firewall policies

The configuration is *policy based*. More than one policy can exist on the router for complex configurations.

If more than one policy is created, every IP interface must de defined within every policy. An interface can only be defined as private in one security policy. An interface can only be defined as public in up to two security policies.

8.2 Configuring the firewall to provide NAT



The basic configuration for the router is that the LAN is considered private and the WAN is considered public.

```
Manager red> ena fire

Info (177257): 31-Oct-2001 13:01:56

  Firewall enabled.

Info (177003): Operation successful.


Manager red> create fire poli=f

Info (177003): Operation successful.


Manager red> add fire poli=f int=eth0 type=private

Info (177003): Operation successful.


Manager red> add fire poli=f int=eth1 type=public

Info (177003): Operation successful.
```

Now Network Address Translation (NAT) is used to ensure all traffic from the LAN is translated to appear as if it has come from the WAN.

```
Manager red> add fire poli=f nat=enhanced int=eth0 gblint=eth1

Info (177003): Operation successful.
```

As an alternative to the above, if the Public IP address of the firewall is known, then this can be specified in the firewall policy. This is used for added security, but is not necessary. In this case it is assumed that the Public IP or Global IP address of the firewall is 200.20.20.7

```
Manager red> add fire poli=f nat=enhanced int=eth0 gblint=eth1 gblip=200.20.20.7

Info (177003): Operation successful.
```

The firewall policy can be reviewed using <show firewall policy>.

```
Manager red> sho fire policy


Policy : f
  Accounting ....................... disabled
  Enabled Logging Options ........... none
  Enabled Debug Options ............. none
  Identification Protocol Proxy ..... enabled
  Enabled IP options ................ none
  Enabled ICMP forwarding ........... none
  Receive of ICMP PINGS ............. enabled
  Private Interface : eth0
Public Interface  : eth1
    Method ......................... dynamic
    NAT ............................ enhanced
      Method ....................... enhanced dynamic
      Private Interface ............. eth0
      Global IP ..................... 200.20.20.7
```

8.3 ICMP handing

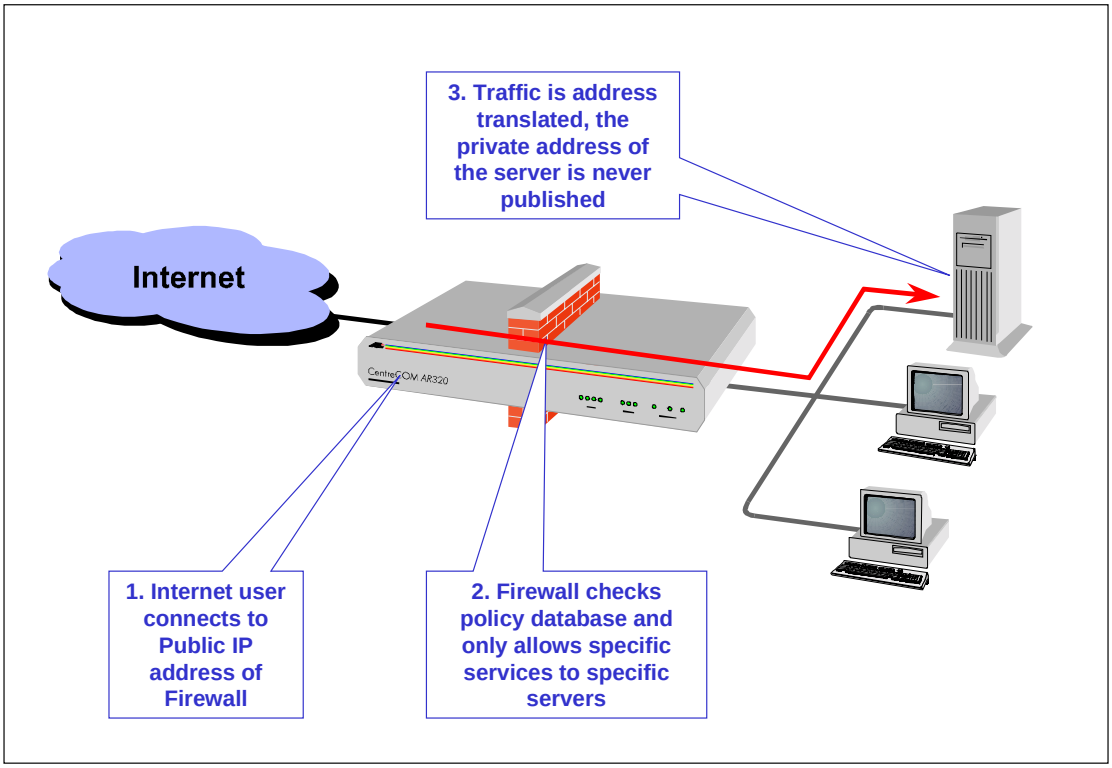
By default the firewall is configured to receive & respond to ICMP pings.

```
Manager red> disable fire poli=f ping

Info (177003): Operation successful.
```

The firewall, in its default configuration, will not forward any ICMP packets. In order to allow the router to pass on pings from the LAN to devices on the WAN, ICMP forwarding must be enabled for ping.

```
Manager red> enable fire poli=f icmp_forward=ping

Info (177003): Operation successful.
```

8.4 Hosting servers behind the Firewall



It is often necessary to host web and mail servers behind the firewall which are accessible by the outside world. This is provided using a firewall rule.

```
Manager red> add fire poli=f rule=2 int=eth1 gblip=200.20.20.7 ip=192.168.1.2 pr

ot=tcp po=25 gblpo=25 act=allow

Info (177003): Operation successful.
```

The firewall policy will now forward any SMTP traffic that is directed to 200.20.20.7 to the SMTP server at 192.168.1.2.

Similar rules could be provided for HTTP servers.

```
Manager red> add fire poli=f rule=3 int=eth1 gblip=200.20.20.7 ip=192.168.1.3 pr

ot=tcp po=80 gblpo=80 act=allow

Info (177003): Operation successful.
```

8.5 Limiting access to websites

The firewall has the ability to contain access lists of banned websites by IP address. In the current 2.2.2 software, this does not filter on the actual URL, but filters on the IP address that relates to the URL.

The banned websites are stored as a text file in the router's flash. The advantage of this system is that the router can use the 'trigger' scheduling facility to go and pick up an updated file from a TFTP server automatically. This means that only one copy of the 'banned file' needs to be kept up to date.

A file can be generated on the router using the built in text editor. In this example the file only contains 2 rogue IP networks and 2 rogue hosts.

```
# Banned Networks
# IP            - IP              Label                    Comment
# ------------------------------------------------------------------------------
200.1.1.1       - 200.1.1.254     another banned network   # banned
117.2.2.1       - 117.2.2.254     banned network           # banned


# Banned Hosts
# IP                              Label                    Comment
# ------------------------------------------------------------------------------
202.36.1.19                       www.sexcity.example      # porn
111.111.111.111                   www.porn.example         # illegal content


# ------------------------------------------------------------------------------
# end of file
Ctrl+K+H = Help | File = update.txt       |   Insert   |          |      1:1
```

Once the file is on the router the list is added to the firewall policy for use by a rule.

```
Manager red> add fire poli=f list="latest update" type=ip file=update.txt
Info (177003): Operation successful.
```

The list can now be viewed. Note this is not viewing the contents of the text file, this is the firewall's interpretation of the text file now it has been parsed.

```
Manager red> sho fire poli=f list

Policy : f


IP List : latest update (update.txt )

IP              - IP               Label

-------------------------------------------------------------------------------

117.2.2.1         117.2.2.254      another banned network

168.1.1.1         168.6.1.1        banned network

202.36.1.19                        www.sexcisy.example

111.111.111.111                    www.porn.example

-------------------------------------------------------------------------------
```

So far we have only defined the list, we have not defined an action to take. In this example we will consider all the contents of the file to be an illegal destination. We now need to add a rule applied to Eth0.

```
Manager red> add firewall policy=f rule=7 action=deny interface=eth0

     list="latest update" protocol=all

Info (177003): Operation successful.
```

A trigger could easily be defined that downloads a file via TFTP / HTTP transfer from a central file at 11.48pm every night. Obviously you would choose a random time during the quiet surfing window, avoid activating triggers exactly on the hour - everyone else will be too.

9 Logging and Notification

9.1 Logging to the Internal Temporary Log

The internal log of the router stores the last 200 log messages on a scrolling basis. This is known as the Temporary log. This can be seen by typing <show log>.

```
Manager red> sho log


Date/Time   S Mod  Type  SType Message
-------------------------------------------------------------------------------
31 11:21:36 4 ENCO ENCO  STAC  STAC SW Initialised
31 11:21:36 4 ENCO ENCO  CRYP  Cryptek Chip Startup Test Passed
31 11:21:36 4 ENCO ENCO  STAC  STAC SW History Allocated - 2 channels
31 11:21:36 7 SYS  REST  NORM  Router startup, ver 2.2.2-00, 20-Jun-2001, Clock
                               Log: 11:21:19 on 31-Oct-2001
--More--  (<space> = next page, <CR> = one line, C = continuous, Q = quit)
```

The log can be reviewed in reverse order:

```
Manager red> sho log rev


Date/Time   S Mod  Type  SType Message
-------------------------------------------------------------------------------
31 13:45:04 3 IPG  CIRC  CONF  Local request to reset eth1 IP accepted
31 13:01:57 6 FIRE FIRE  ENBLD 31-Oct-2001 13:01:56    Firewall enabled
31 11:45:04 3 IPG  CIRC  CONF  Remote request to set eth1 IP to 200.20.20.163
                               accepted
31 11:38:47 3 USER USER  LON   manager login on port0
31 11:21:36 4 ENCO ENCO  STAC  STAC SW History Allocated - 2 channels
31 11:21:36 7 SYS  REST  NORM  Router startup, ver 2.2.2-00, 20-Jun-2001, Clock
--More--  (<space> = next page, <CR> = one line, C = continuous, Q = quit)
```

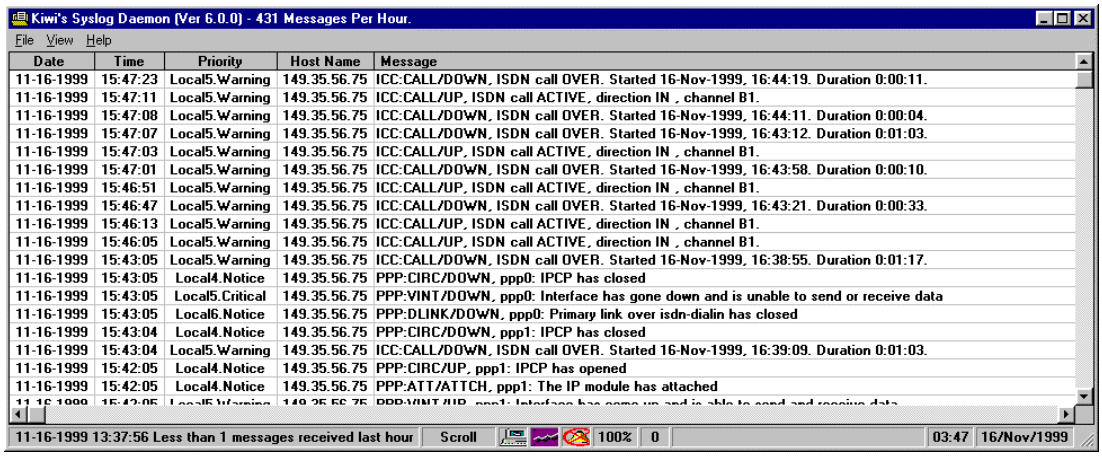
This temporary log will be lost upon start-up. The log can also be flushed during troubleshooting. As a rule, a log on a firewall should never be flushed during the working of a firewall since the log could include information about an attempted attack.

```
Manager red> flush log out=te

Info (157003): Operation successful.


Manager red> sho log

Info (157292): No (matching) log messages found.
```

9.2 Logging to an External SysLog Server

The router can pass every message to an external SysLog server. Most Unix distributions include a Syslog Daemon, a freeware Syslog Daemon for Win32 is available from

http://www.kiwi-enterprises.com.



Not all messages are of the same severity. Most users find that it is only necessary to process packets of severity 3 and above.

To send messages of severity 3 and above to a Syslog Daemon on a PC with IP address 192.168.1.5,

```
Manager red> create log out=1 dest=syslog server=192.168.1.5

Info (157265): Output definition successfully created.



Manager red> add log out=1 filter=1 act=process severity=>3

Info (157273): Filter added successfully.
```

9.3 Logging to a SysAdmin via e-mail

The router has a built in e-mail client that can be used to send messages to a Manager via e-mail.

The router should be configured to point to a DNS.

```
Manager red> set ip nameserver=158.43.240.4

Info (105282): Name server successfully updated.
```

A hostname for the router should be chosen. This will be the hostname from whom the mail is sent.

```
Manager red> set mail hostname=red.mydomain.example

Info (134003): Operation successful.
```

Now a log output must be defined

```
Manager red> cre log out=2 dest=email messages=200 to=netadmin@mydomain.example

Info (157265): Output definition successfully created.


Manager red> add log out=2 filt=1 severity=>3 act=process

Info (157273): Filter added successfully.
```

The router will now buffer up the last 200 messages in memory and then send the log as an e-mail to 'netadmin@mydomain.example'.

9.4.2 E-mail Firewall Notification

When a firewall event such as a port scan or DoS attack occurs, by default the firewall will inform the manager if he or she is logged into the unit at the time. The firewall can be configured to send an E-mail to the sysadmin.

```
Manager red> ena fire notify=mail to=netadmin@mydomain.example

Info (177003): Operation successful.
```

The firewall notify configuration can be seen with the <show fire command>. In this case the firewall will notify of attacks and scans to both the manager (if logged on) and send an E-mail

```
Manager red> sho fire


Firewall Configuration


Status ..................... disabled

Enabled Notify Options .... manager mail

Notify Mail To ............. netadmin@mydomain.example

--More--  (<space> = next page, <CR> = one line, C = continuous, Q = quit)
```

9.4 SNMP Management & Traps

The router supports SNMP management and can be configured to send SNMP traps to an SNMP trap-host. It is not recommended to use *public* or *private* as SNMP community names.

```
Manager red> ena snmp

Info (159003): Operation successful.


Manager red> create snmp community=secret open=no access=read

Info (159003): Operation successful.


Manager red> add snmp community=secret traphost=192.168.1.5

Info (159003): Operation successful.


Manager red> add snmp community=secret manager=192.168.1.5

Info (159003): Operation successful.


Manager red> enable snmp authenticate_trap

Info (159003): Operation successful.
```

In this case an SNMP management station such as CastleRock's SNMPc is situated at 192.168.1.5 configured to listen to SNMP traps. The SimpleWeb, referenced at the end of this document, includes links to freeware SNMP Trap Recievers.

9.4.1 SNMP Linktrap Notification

When a link state changes on a router's interface, it can send a trap to the SNMP trap host. To enable Linktraps on Eth0 & Eth1,

```
Manager red> ena int=eth0 linktrap

Manager red> ena int=eth1 linktrap
```

This means that if the Broadband Ethernet link drops (such as CPE reboot) the router will inform the SNMP traphost.

9.4.2 SNMP Firewall Notification

When a firewall event such as a port scan or DoS attack occurs, by default the firewall will inform the manager if he or she is logged into the unit at the time. The firewall can be configured to send an SNMP trap to the traphost.

```
Manager red> ena fire notify=snmp

Info (177003): Operation successful.
```

The firewall notify configuration can be seen with the <show fire command>. In this case the firewall will notify of attacks and scans to the manager (if logged on) and send an SNMP trap to the traphost.

```
Manager red> sho fire


Firewall Configuration


Status ..................... enabled

Enabled Notify Options .... manager snmp

--More--  (<space> = next page, <CR> = one line, C = continuous, Q = quit)
```

9.5 Firewall Events

A useful command to look at all the firewall events that have occurred since boot up is <show firewall event>. This lists all the Allow, Deny & Notify events. This cannot be cleared until the router has been rebooted.

This is useful when adding firewall rules to the firewall policy. If a rule works, you will see a flow in the allow table. If a rule fails, you will see the rule as a deny.

The <show fire event rev> dissplays the output in reverse time order.

```
Manager red> sho fire event


Policy : f - Notify Events:

Date/Time   Dir Prot Number IP:Port <map> Dest IP:Port /Reason /IP header

-------------------------------------------------------------------------------

31 13:01:56                 Firewall enabled

31 13:54:14                 Firewall disabled

-------------------------------------------------------------------------------


Policy : f - Deny Events:

Date/Time   Dir Prot Number IP:Port <map> Dest IP:Port /Reason /IP header

-------------------------------------------------------------------------------

31 13:42:15 IN  UDP       1 200.20.20.11:138 200.20.20.255:138

                Policy rejected

                450000e5 efdc0000 8011aeda 9523380b 952338ff 008a008a 00d1dca0

                1102c048 9523380b 008a00bb 00002045 44454445 46464646 43455046 5

0454946

                46454344

--More--  (<space> = next page, <CR> = one line, C = continuous, Q = quit)
```

10 Securely Managing your Firewall

You can manage your Firewall via either VT100 terminal, Telnet, SNMP or SecureShell.

10.1 VT100 terminal

Like all IT equipment, a unit is only as safe as the communications room door. Keep your door locked. Always remember to logout when you have finished administering the firewall.

```
Manager red>

Manager red>

Manager red> logout


red login:
```

10.2 Telnet

It is possible to apply a filter to only allow Telnet to the router from a limited number of devices. In this example we will limit the hosts which can telnet to the router to be only 192.168.1.5.

```
Manager red> add ip filt=1 ent=1 act=include so=192.168.1.5 sm=255.255.255.255
des=192.168.1.1 dm=255.255.255.255 prot=tcp dp=23

Info (105003): Operation successful.


Manager red> add ip filt=1 ent=2 act=exclude so=0.0.0.0 sm=0.0.0.0 des=192.168.1.1
dm=255.255.255.255 prot=tcp dp=23

Info (105003): Operation successful.


Manager red> add ip filt=1 entry=3 act=include so=0.0.0.0 sm=0.0.0.0

Info (105003): Operation successful.


Manager red> set ip int=eth0 filter=1

Info (105003): Operation successful.
```

An alternative mechanism is to disable the Telnet Server and rely on other forms of management.

```
Manager red> disable telnet server

Info (133003): Operation successful.
```

The other mechanism is to use 'System Security Mode' and enable Remote Security Officers for only individual IP addresses.

Login as manager at 9600,8,n,1,hw and add a user into the User Accounts Database of Security Officer Privilege.

```
Manager red> add user=secoff pass=mypassword priv=security

User Authentication Database

-------------------------------------------------------------------------------

Username: secoff ()

   Status: enabled    Privilege: Sec Off   Telnet: no    Login: yes

   Logins: 0          Fails: 0        Sent: 0           Rcvd: 0

   Authentications: 0 Fails: 0

-------------------------------------------------------------------------------
```

Enable the Remote Security Officer (RSO) and add an IP range as able to login as RSO. In System Secure Mode, Secuity Officers can only login to Asyn0 by default.

```
Manager red> ena user rso

Info (145057): RSO has been enabled.


Manager red> add user rso ip=192.168.1.5 mask=255.255.255.255

Remote Security Officer Access is enabled

Remote Security Officer ... 192.168.1.5/255.255.255.255
```

Now Enable System Security

```
Manager red> ena sys sec

Info (134003): Operation successful.
```

Telnet access as 'Security Officer' is now limited to the Asyn0 port and 192.168.1.5. It is now possible to remove the manager's login privilege. Do not forget to change the ‘manager' password.

```
SecOff red> set user=manager login=no

Number of logged in Security Officers currently active.....1

User Authentication Database

------------------------------------------------------------------------------

Username: manager ()

   Status: enabled    Privilege: manager   Telnet: no    Login: no
```

10.3 HTTP server

Most of the AR Routers include an HTTP server, but not all routers are configurable via HTTP. in order to ensure you are not DOS attacked by any of the popular internet worms, it is recommended that you disable the HTTP server.

```
SecOff red> dis http server

Info (184003): Operation successful.
```

10.3 SNMP management

The firewall can generate SNMP traps to a Traphost and can be interrogated by SNMP get/set from a Management Station.

Ensure that if you are using SNMP that 'Authenticate Traps' are enabled.

It is not recommended to allow write access a secure firewall from either a private or public device. The security within SNMP is based entirely on the community name, where it is unlikly that the community name remains a secret.

10.3 SecureShell

SSH offers a user the same interface as Telnet but protects and authenticates the session. RSA public keys are used for connection and authentication. DES encryption is used for the Encryption. There are a number of SecureShell packages available. Some are included in the references section at the end of this guide.

An encryption key must first be created. This can only be done while logged in as a 'Security Officer'. Connect to the router as manager at 9600,8,n,1,hw via the Asyn0 port. Add a 'Security Officer' to the User Authentication Database.

```
Manager red> add user=secoff pass=mypassword priv=security

User Authentication Database

---------------------------------------------------------------------------

Username: secoff ()

   Status: enabled    Privilege: Sec Off   Telnet: no    Login: yes

   Logins: 0          Fails: 0        Sent: 0           Rcvd: 0

   Authentications: 0 Fails: 0

---------------------------------------------------------------------------
```

Logout of the router and re-login as the 'Security Officer'

```
Manager red> logout


red login: secoff

Password:
```

Now Enable System Security Mode on the router.

```
SecOff red> enable sys security

Info (134003): Operation successful.
```

Create an RSA host key

```
SecOff red> create enco key=0 type=rsa length=1024 description=hostkey

Info (173278): RSA Key Generation process started.

Info (173279): RSA Key generation process completed.
```

Create an RSA server key

```
SecOff red> CREATE ENCO KEY=1 TYPE=RSA LENGTH=768 DESCRIPTION=serverkey

Info (173278): RSA Key Generation process started.

Info (173279): RSA Key generation process completed.
```

Inspect the Enco keys

```
SecOff red> sho enco key

   ID  Type      Length Digest   Description              Mod   IP

   ---------------------------------------------------------------------------

    0  RSA-PRIVATE 1024 135E12CA hostkey                  -     -

    1  RSA-PRIVATE  768 83602F92 serverkey                -     -
```

Enable the SecureShell server

```
SecOff red> ena ssh server hostkey=0 serverkey=1 expirytime=1 logintime=60

Info (175003): Operation successful.
```

Add a SecureShell user. Since 'System Security Mode' has been enabled, SSH users get the same privilege as the standard UAD users. The SSH username must therefore match the username of a Security Officer in the User Accounts Database. Note the password does not have to be the same.

```
SecOff red> add ssh user=secoff pass=sshuser ip=192.168.1.0 mask=255.255.255.0

Info (175003): Operation successful.
```

The Security Officer, secoff, will now be able to login to the router via SSH from any point on the 192.168.1.0 network. This can be made more secure by stating a more specific mask in the SSH user database.

It is recommended that both HTTP & Telnet servers be disabled.

```
SecOff red> dis http server

Info (184003): Operation successful.


SecOff red> dis telnet server

Info (133003): Operation successful.
```

Appendix A. Upgrading to the latest Software

The AR Router software is distributed in three parts; firmware, software release and software patch.

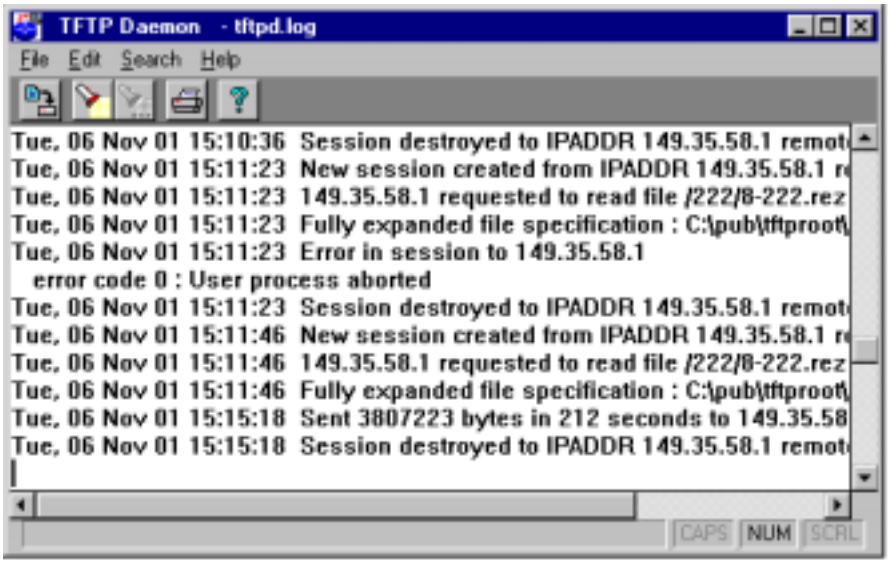
Firmware is stored on an EPROM on the motherboard. This contains a very basic operating system that includes basic IP functionality. This is never changed.

The release is stored in the flash memory in the form <8-231.rez> where the 8 refers to the AR3xx series, 231 refers to major revision 2, minor revision 3 and service revision 1. In order to upgrade from a major.minor release to a new major.minor release, a password key is required to generate a licence. In order to upgrade from a service release to another service release for the same major.minor version then no password is required to generate the licence.

The patch file is stored in flash memory and is loaded after the release file has been loaded. Patches are in the format 8231-01, meaning patch 01 for software release 2.3.1.

A.1 Downloading a file to the router.

Set-up a TFTP server on the LAN. A copy of the AT-TFTP-32 server is available on the Reference Manual CD-ROM.



Use File>Preferences to set the Default Transfer Directory.

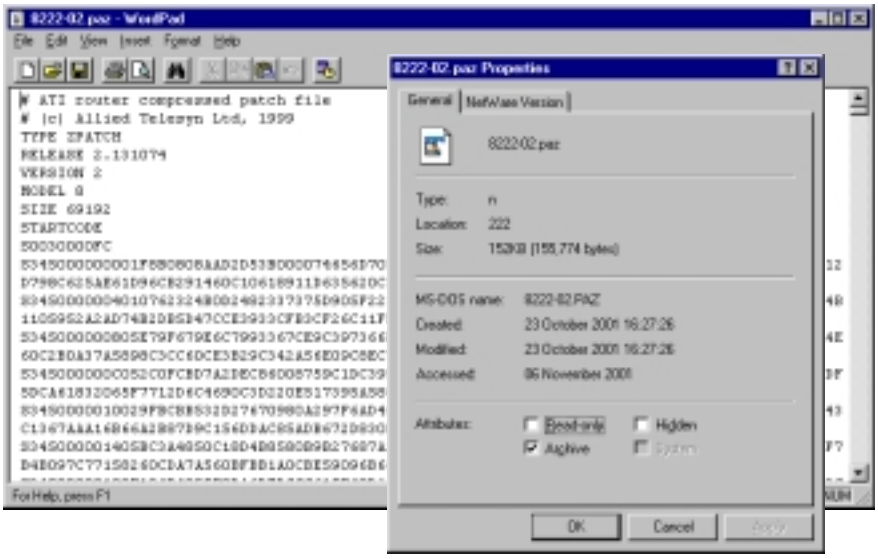
Check your router can ping the TFTP server.

```
Manager red> ping 192.168.1.5 sipaddress=192.168.1.1


Echo reply 1 from 192.168.1.5 time delay 3 ms

Echo reply 2 from 192.168.1.5 time delay 3 ms
```

Check whether you have enough space on the router with <show flash>.

```
Manager > sho flash

FFS info:

global operation ...... none

compaction count ...... 5

est compaction time ... 120 seconds

files ..................   1821472 bytes  (6 files)

garbage ................     85316 bytes

free ...................     59292 bytes

required free block ...    131072 bytes

total ..................   2097152 bytes

--More--  (<space> = next page, <CR> = one line, C = continuous, Q = quit)
```

Patches and Releases appear as different sizes in MS-Windows as they appear on the router since on a PC include an extra header at the top of the file. In order to see the size a file will appear when it is on a router, open the patch or release in a text editor such as WordPad. The true size of the file will appear at the top of the file.



If there is not enough free space on the unit, delete any unnecessary files such as help files & old config files. If upgrading a release you will typically have to delete the old release.

Activate the flash compaction on the router. This defragments the flash memory clearing contiguous space and removing garbage.

```
Manager > act flash comp

Info (131260): Flash compacting...

DO NOT restart the router until compaction is completed.


Manager >

Info (131261): Flash compaction successfully completed.
```

Check you now have enough free space to load your file with <show flash>.

Confirm the integrity of all other files on the unit with <show ffile check>

```
Manager > sho ffile check

dev   creator  name      type       size   file date & time    address check

-------------------------------------------------------------------------------

flash          help      hlp      139682  23-Jun-2001 01:03:44  01CC00B8  Good

flash  inst    release   lic          96  01-Aug-2001 09:32:29  01CE23A4  Good

flash  load    8222-01   paz       12264  01-Aug-2001 09:52:43  01C79B80  Good

flash  load    8-222     rez     1668860  01-Aug-2001 09:47:41  01CE2444  Good
```

You are now ready to tell the router to go and get the file from the TFTP server. Remember the PC is the server. You 'load' a file from the server to the router; you 'upload' a file from the router to the server.

```
Manager red> load dest=flash server=192.168.1.5 file=8222-02.paz

Info (148270): File transfer successfully completed.

Manager red>
```

If a large transfer is taking place you can check the progress of the transfer using <show load>.

```
Manager red> sho load

Loader Information

-------------------------------------------------------------------------------

Current Load:

  Method ............. TFTP

Status ............. Loading

  Load Level ......... 30%
```

If you are doing a large number of file transfers, you can set the 'loader' defaults with <set load>. This avoids the need to specify destination & server with every file transfer.

```
SecOff red> set load dest=flash server=192.168.1.5

Info (148003): Operation successful.
```

When a load is complete, check the integrity of the files with <show ffile check>. You file is now on the unit.

A.2 Installing a new patch.

Download the correct patch for the operating release into the router. The latest files can be obtained from the Allied Telesyn Research Website. A table shows the latest patch for each release. If visiting frequently, remember to refresh your browser.

http://www.alliedtelesyn.co.nz/support/updates/patches.html

If flash space is tight you may have to delete and old patch and activate the flash compaction.

Check the file has loaded correctly, with <show ffile check>. Now check which patch the router is currently booting off with <show install>. This will be detailed as the 'current install'.

```
Manager red> sho install

Install     Release              Patch                Dmp

-------------------------------------------------------------------------

Temporary   -                    -                    -

Preferred   flash:8-222.rez      flash:8222-01.paz    -

Default     EPROM (8-1.7.0)      -                    -

-------------------------------------------------------------------------

Current install

-------------------------------------------------------------------------

Preferred   flash:8-222.rez      flash:8222-01.paz    -

-------------------------------------------------------------------------
```

Now tell the router that the new patch is the preferred install.

```
Manager red> set inst=pref rel=8-222.rez pat=8222-02.paz

Info (149003): Operation successful.
```

Now check the preferred install has been correctly recognised.

```
Manager red> sho inst

Install     Release              Patch                Dmp

-------------------------------------------------------------------------

Temporary   -                    -                    -

Preferred   flash:8-222.rez      flash:8222-02.paz    -

Default     EPROM (8-1.7.0)      -                    -

-------------------------------------------------------------------------


Current install

-------------------------------------------------------------------------

Preferred   flash:8-222.rez      flash:8222-01.paz    -

-------------------------------------------------------------------------
```

Check you have created/set your configuration since you will now reboot the router. Creating / setting the config has no affect on the upgrade, it is only so you do not lose any work.

Now do a full reboot with <restart reboot>.

Your router should now come up running the new patch. You can check this with either <show system> or <show release>.

If using an untested or development patch, rather than setting the install to 'preferred' where the router will boot from that patch from now on, you can set the install to 'temporary'. This will only make the patch active for the following reboot. Rebooting the unit again will revert the router back to the preferred.

A.3 Release Licences

If upgrading from one release to another release a licence is required. You can view the licences you have on your unit with the command <show release>.

```
Manager red> sho release

Release                   Licence        Period

------------------------------------------------------------------

flash:load\8-221.rez      full           -

------------------------------------------------------------------
```

Before loading a new operating system on to the unit, you will need to enter a release licence.

A.3.1 Entering a Service Release License

If upgrading a service release such as moving from 2.2.1 to 2.2.2, no password is required. A service release is a compiled operating release incorporating many patches but does not contain new features. To upgrade from 2.2.1 to 2.2.2, first check your 2.2.1 licence is still valid with <show release>. You then use <enable release> to generate your licence for the operating system. Release licences are stored in a file <release.lic> on the router.

```
Manager red> ena rel=8-222.rez num=2.2.2

Info (149261): Release licence added to dynamic list, wait for list to be saved

to FLASH.

Info (149264): Write of release licence file completed OK.
```

Now check your licence table with <show release>.

```
Manager red> sho release

Release                   Licence        Period

------------------------------------------------------------------

flash:load\8-222.rez      full           -

flash:load\8-221.rez      full           -

------------------------------------------------------------------
```

A.3.2 Entering a Major or Minor Release license

If you are upgrading from a major.minor release to a different major.minor release such as 2.2.x to 2.3.x, then new features have been added to the software and a serial number based password is required to upgrade your unit. This is usually purchased from your local distributor or reseller. For more information contact your local Allied Telesyn office.

When you purchase your upgrade, to generate the code a serial number is required. The simplest way to find the serial number is to type <show system>.

```
SecOff red> sho sys

Router System Status                          Time 18:47:35 Date 06-Nov-2001.

Board      ID  Bay Board Name                    Rev   Serial number

-------------------------------------------------------------------------------

Base       82      AR320                         M2-0  41912745

-------------------------------------------------------------------------------
```

Upgrades can be processed quicker if your distributor / reseller gets the complete output of <show system> rather than just the serial number. Reading the serial number from the cardboard box or the bottom of the router leads to mistakes. The algorithm does not check the serial number on the cardboard box, it checks the hard coded serial number on the motherboard.

The following is the format for a release password to enable software version 2.3.1.

```
Manager red> enable rel=8-231.rez num=2.3.1 pass=87AB1A801083

Info (149261): Release licence added to dynamic list, wait for list to be saved

to FLASH.

Info (149264): Write of release licence file completed OK.
```

Now check your release licence table with <show release> and ensure you have a full release licence.

```
Manager red> sho rel

Release                   Licence        Period

-------------------------------------------------------------------

flash:load\8-231.rez      full           -

flash:load\8-221.rez      full           -

-------------------------------------------------------------------
```

Do not disable any of your old releases until you have thoroughly tested your new release.

A.4 Upgrading to a new release

Download the correct release to your TFTP server. ***Do not delete any files until you have ensured that you have a release license for your new operating system with <show release>. Please read the section above about release licences before proceeding.***

Download the new release to your router. You will probably have to delete your old release, patches and help-files. Remember to <activate flash compaction> to defragment the flash and clear any garbage. Check there is free space with <show flash>.

Remember not to reboot the router at this stage. The router does not have any software in the flash and may resort to booting from a limited firmware (EPROM) release. This may affect your ability to contact the unit if you are upgrading the router remotely. Upgrading remotely is never recommended unless you are an experience user or have someone on site with a config cable that can operate HyperTerminal.

Once you have downloaded the file, check the release file's integrity in the flash with <show ffile check>.

Now we are ready to set the preferred install. First view the old install with <show install>.

```
Manager red> sho install

Install     Release              Patch                Dmp

-------------------------------------------------------------------------

Temporary   -                    -                    -

Preferred   flash:8-222.rez      flash:8222-02.paz    -

Default     EPROM (8-1.7.0)      -                    -

-------------------------------------------------------------------------

Current install

-------------------------------------------------------------------------

Preferred   flash:8-222.rez      flash:8222-02.paz    -

-------------------------------------------------------------------------
```

Now delete the preferred install. This is important since it ensures you do not just change the release but leave an old patch as the preferred patch.

```
Manager red> del inst=pref

Info (149003): Operation successful.
```

Now set the new release as the preferrred release with <set inst=pref>.

```
Manager red> set inst=pref rel=8-231.rez

Info (149003): Operation successful.
```

Now check that the new release is selected as the preferred install and that the router is not trying to boot from an old patch.

```
Manager red> sho install

Install     Release              Patch                Dmp

-------------------------------------------------------------------------

Temporary   -                    -                    -

Preferred   flash:8-231.rez      -                    -

Default     EPROM (8-1.7.0)      -                    -

-------------------------------------------------------------------------

Current install

-------------------------------------------------------------------------

Preferred   flash:8-222.rez      flash:8222-02.paz    -

-------------------------------------------------------------------------
```

A.4.1 Release Upgrade checklist.

Do you have a licence for the new release? <show release>

Is the release file loaded into the flash uncorrupted? <show ffile check>

Have you set the release as the preferred install correctly? <show install>

You can now reboot your unit with <restart reboot>. When your router has rebooted, login to the unit and use <show system> or <show release> to see that you are now running the new release.

Appendix B. VT100 Commands

Function	VT100 Command
Move cursor within command line	← or →
Move to start of line	Ctrl^A
Move to end of line	Ctrl^E
Delete character to left of cursor	[Delete] or [Backspace]
Toggle between insert/overstrike	Ctrl^O
Clear command line	Ctrl^U
Recall previous command	↑ or Ctrl^B
Recall next command	↓ or Ctrl^F
Display command history	Ctrl^C or <show port history>
Clear command history	<reset port history>
Recall matching command	Ctrl^I or [Tab]
Terminal Telnet session	[Ctrl/D]

Appendix C. Handling Configs & Scripts

C.1 Viewing and editing a file at the prompt

The VT100 built in text editor can be used to edit config files. This can be used to edit a file in the flash memory. This is not a recommended method of configuring a router for a first-time user.

Ensure your terminal or Telnet window is set for VT100 emulation and that the control and arrows keys are set to 'Terminal keys' rather than 'Windows keys'.

***Handy Hint**: In some terminal packages, lines may appear to 'jump around'. The screen can be refreshed by typing the VT100 sequence Ctrl^W*

To edit a file you can use the <edit test01.cfg>

```
Manager banana.mydomain.example> sho file=test01.cfg

#

# SYSTEM configuration

#

set system name="banana.mydomain.example"

set system location="abingdon, uk"

set system contact="sysadmin@smtp.mydomain.example"


Ctrl+K+H = Help | File = test01.cfg       |   Insert   |          |      1:1
```

To bring up the help screen within the edit window, you can use Ctrl+K+H. To return to the editing window you press Return.

```
Edit V1.2


Cursor Movement                          Deletion

UpArrow ..... cursor up one line         Ctrl+T ...... delete one word right

DownArrow ... cursor down one line       Ctrl+Y ...... delete line

Ctrl+B ...... move to start of file      Ctrl+K+B .... begin block mark

Ctrl+D ...... move to end of file        Ctrl+K+C .... copy block to paste


                            Press <RETURN> to continue
```

C.2 AR-Edit 1.2 Help

Cursor Movement

UpArrow	cursor up one line
DownArrow	cursor down one line
RightArrow	cursor right one column
LeftArrow	cursor left one column
Ctrl+B	move to start of file
Ctrl+D	move to end of file
Ctrl+A	move to start of line
Ctrl+E	move to end of line
Ctrl+U	move up one screen
Ctrl+V	move down one screen
Ctrl+X	move down one line
Ctrl+Z	move up one line
Ctrl+F	move one word right

Miscellaneous

Ctrl+I	insert mode
Ctrl+O	overstrike mode
Ctrl+W	refresh the screen
Ctrl+K+O	open a file

Deletion

Ctrl+T	delete one word right
Ctrl+Y	delete line

Block Operations

Ctrl+K+B	begin block mark
Ctrl+K+C	copy block to paste
Ctrl+K+D	unmark block
Ctrl+K+U	cut block to paste
Ctrl+K+V	paste block
Ctrl+K+Y	delete block

Search

Ctrl+K+F	find text
Ctrl+L	find again

Exit

Ctrl+K+X	exit editor, with save
Ctrl+C	abort the editor

C.3 Viewing configuration file at the prompt

A particular config file in the flash can be viewed by typing <show file=*filename*>. This will output the contents of the file to the TTY terminal, similar to the MS-DOS <more> command.

```
Manager banana.mydomain.example> sho file=test01.cfg

File : test01.cfg


1:

2:#

3:# SYSTEM configuration

4:#

5:set system name="banana.mydomain.example"

6:set system location="abingdon, uk"

7:set system contact="sysadmin@smtp.mydomain.example"

8:--More--  (<space> = next page, <CR> = one line, C = continuous, Q = quit)
```

Appendix D. IP Addressing Guides

D.1 CIDR IP address Notation

CIDR Notation	DotQuad Notation	CIDR Notation	DotQuad Notation
/0	0.0.0.0	/16	255.255.0.0
/1	128.0.0.0	/17	255.255.128.0
/2	192.0.0.0	/18	255.255.192.0
/3	224.0.0.0	/19	255.255.224.0
/4	240.0.0.0	/20	255.255.240.0
/5	248.0.0.0	/21	255.255.248.0
/6	252.0.0.0	/22	255.255.252.0
/7	254.0.0.0	/23	255.255.254.0
/8	255.0.0.0	/24	255.255.255.0
/9	255.128.0.0	/25	255.255.255.128
/10	255.192.0.0	/26	255.255.255.192
/11	255.224.0.0	/27	255.255.255.224
/12	255.240.0.0	/28	55.255.255.240
/13	255.248.0.0	/29	255.255.255.248
/14	255.252.0.0	/30	255.255.255.252
/15	255.254.0.0	/31	255.255.255.254
		/32	255.255.255.255

D.2 RFC 1918 Private Address Space

The Internet Assigned Numbers Authority (IANA) has reserved the following three blocks of the IP address space for private internets:

10.0.0.0	10.255.255.255	(255.0.0.0 subnet mask)
172.16.0.0	172.31.255.255	(255.240.0 subnet mask)
192.168.0.0	192.168.255.255	(255.255.0.0 subnet mask)

D.3 Subnetting Guide

Network Address Ranges by Class

IP network addresses are issued as follows:

Class	Range	Default Mask
Class A	1-127	255.0.0.0
Class B	128-191	255.255.0.0
Class C	192-223	255.255.255.0

Maximum Number of Hosts by Class

The maximum number of hosts is achieved by using the default subnet mask for each class (i.e. by having only one subnet).

Class		No. of Addresses
Class A	2^{24}	16,777,216
Class B	2^{16}	65,536
Class C	2^{8}	256

Usable Subnets and Addresses

The top and bottom host numbers of any subnet may not be used. The bottom number is the subnet address and the top number is the broadcast address for the subnet.

Binary Calculations

Decimal		Binary
2^{0}	1	00000001
2^{1}	2	00000010
2^{2}	4	00000100
2^{3}	8	00001000
2^{4}	16	00010000
2^{5}	32	00100000
2^{6}	64	01000000
2^{7}	128	10000000

Subnet Masks - Binary Representations

Decimal	Hex	Binary
.128	80	10000000
.192	C0	11000000
.224	D0	11100000
.240	F0	11110000
.248	F8	11111000
.252	FC	11111100
.254	FE	11111110
.255	FF	11111111

No. of bits	Subnet Mask	No. of Subnets	No. Hosts per Subnet
CLASS B			
1	255.255.128.0	2	32766
2	255.255.192.0	4	16382
3	255.255.224.0	8	8190
4	255.255.240.0	16	4094
5	255.255.248.0	32	2046
6	255.255.252.0	64	1022
7	255.255.254.0	128	510
8	255.255.255.0	256	254
9	255.255.255.128	512	126
10	255.255.255.192	1024	62
11	255.255.255.224	2048	30
12	255.255.255.240	4096	14
13	255.255.255.248	8192	6
14	255.255.255.252	16384	2
CLASS C			
1	255.255.255.128	2	126
2	255.255.255.192	4	62
3	255.255.255.224	8	30
4	255.255.255.240	16	14
5	255.255.255.248	32	6
6	255.255.255.252	64	2

IP Address Ranges for Class C Subnets

Subnet Mask	Subnet No.	Subnet Address	Address Range	B'cast
128	0	0	1-126	127
	1	128	129-254	255
192	0	0	1-62	63
	1	64	65-126	127
	2	128	129-190	191
	3	192	193-254	255
224	0	0	1-30	31
	1	32	33-62	63
	2	64	65-94	95
	3	96	97-126	127
	4	128	129-158	159
	5	160	161-190	191
	6	192	193-222	223
	7	224	225-254	255
240	0	0	1-14	15
	1	16	17-30	31
	2	32	33-46	47
	3	48	49-62	63
	4	64	65-78	79
	5	80	81-94	95
	6	96	97-110	111
	7	112	113-126	127
	8	128	129-142	143
	9	144	145-158	159
	10	160	161-174	175
	11	176	177-190	191
	12	192	193-206	207
	13	208	209-222	223
	14	224	225-238	239
	15	240	241-254	255
248	0	0	1-6	7
	1	8	9-14	15
	2	16	17-22	23
	3	24	25-30	31
	4	32	33-38	39
	5	40	41-46	47
	6	48	49-54	55
	7	56	57-62	63
	8	64	65-70	71
	9	72	73-78	79
	10	80	81-86	87
	11	88	89-94	95
	12	96	97-102	103
	13	104	105-110	111
	14	112	113-118	119
	15	120	121-126	127
	16	128	129-134	135
	17	136	137-142	143
	18	144	145-150	151
	19	152	153-158	159
	20	160	161-166	167
	21	168	169-174	175
	22	176	177-182	183
	23	184	185-190	191
	24	192	193-198	199
	25	200	201-206	207
	26	208	209-214	215
	27	216	217-222	223
	28	224	225-230	231
	29	232	233-238	239
	30	240	241-246	247
	31	248	249-254	255
252	0	0	1-2	3
	1	4	5-6	7
	2	8	9-10	11
	3	12	13-14	15
	4	16	17-18	19
	5	20	21-22	23
	6	24	25-26	27
	7	28	29-30	31
	8	32	33-34	35
	9	36	37-38	39
	10	40	41-42	43
	11	44	45-46	47
	12	48	49-50	51
	13	52	53-54	55
	14	56	57-58	59
	15	60	61-62	63
	16	64	65-66	67
	17	68	69-70	71
	18	72	73-74	75
	19	76	77-78	79
	20	80	81-82	83
	21	84	85-86	87
	22	88	89-90	91
	23	92	93-94	95
	24	96	97-98	99
	25	100	101-102	103
	26	104	105-106	107
	27	108	109-110	111
	28	112	113-114	115
	29	116	117-118	119
	30	120	121-122	123
	31	124	125-126	127
	32	128	129-130	131
	33	132	133-134	135
	34	136	137-138	139
	35	140	141-142	143
	36	144	145-146	147
	37	148	149-150	151
	38	152	153-154	155
	39	156	157-158	159
	40	160	161-162	163
	41	164	165-166	167
	42	168	169-170	171
	43	172	173-174	175
	44	176	177-178	179
	45	180	181-182	183
	46	184	185-186	187
	47	188	189-190	191
	48	192	193-194	195
	49	196	197-198	199
	50	200	201-202	203
	51	204	205-206	207
	52	208	209-210	211
	53	212	213-214	215
	54	216	217-218	219
	55	220	221-222	223
	56	224	225-226	227
	57	228	229-230	231
	58	232	233-234	235
	59	236	237-238	239
	60	240	241-242	243
	61	244	245-246	247
	62	248	249-250	251
	63	252	253-254	255

Appendix E. References

The following are third party links that the author has found useful during the configuration VPNs & Firewalls. This is no commercial endorsement by Allied Telesyn International of the products or companies below. Information believed to be correct at time of writing.

ICSALabs

TruSecure's ICSA Labs division have been the security industry's central authority for research, intelligence and product certification for over a decade. The ICSA Labs set performance standards for information security products and certify over 95% of the installed base of firewall, anti-virus, cryptography, and IPSec products.

The ICSA Labs also leads security consortia that provide a forum for intelligence sharing among the leading vendors of security products.

http://www.icsa.net

F-Secure SSH Client

F-Secure SSH Client consists of three integrated components. F-Secure SSH Terminal provides the user with secure login connections over unknown or untrusted networks. F-Secure SSH Tunnel enables secure tunnelling of Internet protocol services like email and web browsing. F-Secure SSH File Transfer provides a secure method for file transfers over insecure networks. F-Secure SSH Client authenticates server and encrypts traffic between the client and server. A 30 day trial is available from both the Datafellows website and the AR Router Reference manual CD-ROM.

http://www.datafellows.com/products/ssh/client/

Analyzer

A protocol analyzer, sniffer & capture tool for Win32 using the PCAP driver.

http://netgroup-serv.polito.it/analyzer/

Kiwi's Syslog Daemon

A Shareware Syslog daemon for Win32. A Syslog Generator & Log Viewer are also available.

http://www.kiwi-enterprises.com

WSTTCP

A Packet Generation utility for Win32

http://www.pcausa.com/Utilities/pcattcp.htm

TeraTerm Pro

A VT100 telnet, terminal emulator supporting VT100 emulation. A SecureShell plug-in is also available

http://hp.vector.co.jp/authors/VA002416/teraterm.html

The SimpleWeb

This server, called the "SimpleWeb", provides links and information on network management, including software, RFCs and tutorials. The focus is on SNMP and Internet management, but people interested in other management technologies will also find interesting information

http://www.simpleweb.org/

Appendix F. Examples

F.1 Broadband Connection with Dynamic IP

This script is for a firewall where the WAN IP address is being assigned to the unit via DHCP. This is commonly used in the UK behind a cable modem broadband connection such as ntl:home or Telewest blueyonder Internet

The public IP address of the firewall is dynamically assigned
The broadband router next hop is dynamically assigned

The private syslog server exists at 192.168.1.5
The private tftp server exists at 192.168.1.5

```
#
# SYSTEM configuration
#
set system name="red"
set system location="abingdon, uk"
set system contact="admin@mydomain.example"
set system territory=europe


#
# LOAD configuration
#
set loader server=192.168.1.5 dest=flash method=tftp


#
# IP configuration
#
ena ip
ena ip remote
add ip int=eth0 ip=192.168.1.1
add ip int=eth1 ip=dhcp


#
```

```
# FIREWALL configuration
#
ena fire
cre fire poli="f"
ena fire poli="f" icmp_f=ping
dis fire poli="f" ping
add fire poli="f" int=eth0 type=private
add fire poli="f" int=eth1 type=public
add fire poli="f" nat=enhanced int=eth0 gblin=eth1


#
# LOG module configuration
#
cre log out=1 dest=syslog server=192.168.1.5 secure=no mess=20
add log out=1 filt=1 severity=>3 action=process


#
# HTTP configuration
#
dis http server
```

F.2 Broadband Connection with Static IP

This script is for a firewall where the WAN IP address is static. This is commonly used behind a DSL router broadband connection such as BT OpenWorld business PLUS

The public IP address of the firewall is 200.20.20.7
The broadband router next hop is situated at 200.20.20.6

The private syslog server exists at 192.168.1.5
The private tftp server exists at 192.168.1.5

This example also includes a DHCP server that hands out a pool of 8 IP addresses starting at 192.168.1.16

```
#
# SYSTEM configuration
#
set system name="red"
set system location="abingdon, uk"
set system contact="admin@mydomain.example"
set system territory=europe


#
# LOAD configuration
#
set loader server=192.168.1.5 dest=flash method=tftp


#
# IP configuration
#
ena ip
add ip int=eth0 ip=192.168.1.1 mask=255.255.255.0
add ip int=eth1 ip=200.20.20.7 mask=255.255.255.240
add ip rou=0.0.0.0 mask=0.0.0.0 next=200.20.20.6 int=eth1


#
# FIREWALL configuration
```

```
#
ena fire
cre fire poli="f"
ena fire poli="f" icmp_f=ping
dis fire poli="f" ping
add fire poli="f" int=eth0 type=private
add fire poli="f" int=eth1 type=public
add fire poli="f" nat=enhanced int=eth0 gblin=eth1 gblip=200.20.20.7


#
# LOG module configuration
#
cre log out=1 dest=syslog server=192.168.1.5 secure=no mess=20
add log out=1 filt=1 severity=>3 action=process


#
# DHCP configuration
#
ena dhcp
cre dhcp poli="d" lease=7200
add dhcp poli="d" rou=192.168.1.1 subn=255.255.255.0
add dhcp poli="d" dnss=158.43.240.4,193.113.212.38
add dhcp poli="d" nbno=b-node
cre dhcp ran="d1" poli="d" ip=192.168.1.16 num=8


#
# HTTP configuration
#
dis http server
```

F.3 Hosting servers behind the firewall

This script is for a firewall where the WAN IP address is static. This is commonly used behind a DSL router broadband connection such as BT OpenWorld business PLUS

This configuration uses firewall rules to redirect traffic destined for the WAN to services hosted on servers on the LAN

The public IP address of the firewall is 200.20.20.7
The broadband router / next hop is situated at 200.20.20.4

The internet e-mail/SMTP server exists at 192.168.1.2
The internet WWW/HTML server exists at 192.168.1.3
The private syslog server exists at 192.168.1.5
The private tftp server exists at 192.168.1.5

```
#
# SYSTEM configuration
#
set system name="red"
set system location="abingdon, uk"
set system contact="admin@mydomain.example"
set system territory=europe


#
# LOAD configuration
#
set loader server=192.168.1.5 dest=flash method=tftp


#
# IP configuration
#
ena ip
add ip int=eth0 ip=192.168.1.1 mask=255.255.255.0
add ip int=eth1 ip=200.20.20.7 mask=255.255.255.240
add ip rou=0.0.0.0 mask=0.0.0.0 next=200.20.20.6 int=eth1
```

```
#
# FIREWALL configuration
#
ena fire
cre fire poli="f"
ena fire poli="f" icmp_f=ping
dis fire poli="f" ping
add fire poli="f" int=eth0 type=private
add fire poli="f" int=eth1 type=public
add fire poli="f" nat=enhanced int=eth0 gblin=eth1 gblip=200.20.20.7
add fire poli="f" rule=2 act=allow int=eth1 protocol=tcp port=25 ip=192.168.1.2
set fire poli="f" rule=2 gblport=25 gblip=200.20.20.7
add fire poli="f" rule=3 act=allow int=eth1 protocol=tcp port=80 ip=192.168.1.3
set fire poli="f" rule=3 gblport=80 gblip=200.20.20.7


#
# LOG module configuration
#
cre log out=1 dest=syslog server=192.168.1.5 secure=no mess=20
add log out=1 filt=1 severity=>3


#
# HTTP configuration
#
dis http server
```

F.4 Hosting multiple servers behind a multi-homed firewall

This example uses IP multihoming where the firewall appears as more than one IP address to the outside world

This is particuloarly useful when hosting more than one web server on different public IP or from migrating servers from public addresses to behind the firewall

The main public IP address of the firewall is 200.20.20.7
The secondary public IP address of the firewall is 200.20.20.8
The broadband router / next hop is situated at 200.20.20.4

The internet e-mail/SMTP server exists at 192.168.1.2
The internet WWW/HTML server exists at 192.168.1.3
The extranet WWW/HTML server exists at 192.168.1.4
The private syslog server exists at 192.168.1.5
The private tftp server exists at 192.168.1.5

```
#
# SYSTEM configuration
#
set system name="red"
set system location="abingdon, uk"
set system contact="admin@mydomain.example"
set system territory=europe


#
# LOAD configuration
#
set loader server=192.168.1.5 dest=flash method=tftp


#
# IP configuration
#
ena ip
add ip int=eth0-0 ip=192.168.1.1
```

```
add ip int=eth1-0 ip=200.20.20.7 mask=255.255.255.240

add ip int=eth1-1 ip=200.20.20.8 mask=255.255.255.255

add ip rou=0.0.0.0 mask=0.0.0.0 int=eth1-0 next=149.35.45.6


#

# FIREWALL configuration

#

ena fire

cre fire poli="f"

ena fire poli="f" icmp_f=ping

dis fire poli="f" ping

add fire poli="f" int=eth0-0 type=private

add fire poli="f" int=eth1-1 type=public

add fire poli="f" int=eth1-0 type=public

add fire poli="f" nat=standard int=eth0-0 gblin=eth1-1 gblip=200.20.20.8

add fire poli="f" nat=enhanced int=eth0-0 gblint=eth1-0 gblip=200.20.20.7

add fire poli="f" rule=2 act=allow int=eth1-0 protocol=tcp port=25 ip=192.168.1.2

set fire poli="f" rule=2 gblport=25 gblip=200.20.20.7

add fire poli="f" rule=3 act=allow int=eth1-0 protocol=tcp port=80 ip=192.168.1.3

set fire poli="f" rule=3 gblport=80 gblip=200.20.20.7

add fire poli="f" rule=4 act=allow int=eth1-1 protocol=tcp port=80 ip=192.168.1.4

set fire poli="f" rule=4 gblport=80 gblip=200.20.20.8


#

# LOG module configuration

#

cre log out=1 dest=syslog server=192.168.1.5 secure=no mess=20

add log out=1 filt=1 severity=>3


#

# HTTP configuration

#

dis http server
```